

## CLAIMS

What is claimed is:

1. A surgical cement preparation system for combining a liquid ingredient together with at least one powder ingredient comprising:

a needle and syringe assembly, wherein said needle is structured to couple to said syringe and comprises a closed distal tip and at least one lateral opening located at the distal end of said needle; and

a mixing vial, said mixing vial comprising a removable cap structured to sealably close the end of said mixing vial and said cap further comprising a second opening therethrough and a second removable cap structured to sealably closed said second opening.

2. A surgical cement preparation system for combining a liquid ingredient together with at least one solid powder ingredient comprising:

- a) a first vial dimensioned to completely accommodate a liquid ingredient container within;
- b) a needle and syringe assembly, wherein said needle is structured to couple to said syringe and comprises a closed distal tip and at least one lateral opening located at the distal end of said needle, and wherein said syringe is composed of a material that is chemically compatible with said liquid;
- c) a mixing vial, said mixing vial comprising a removable cap structured to sealably close the end of said mixing vial and said cap further comprising a second opening therethrough and a second removable cap structured to sealably closed said second opening;

- d) a funnel structured to removably couple to both the dimensions of the open end of said mixing vial and those of the receiving end of a polymer delivery barrel.
3. The system according to claim 2, wherein the surgical cement to be prepared is opacified polymethylmethacrylate and said liquid ingredient comprises liquid methacrylate monomer and said solid powder ingredient comprises polymethylmethacrylate and an opacifier.
  4. The system according to claim 3 wherein said opacifier is barium sulfate.
  5. The system according to claim 2 wherein the first vial comprises a container and removable cap.
  6. The system according to claim 5 wherein said first vial container is composed of a material that is chemically compatible with said liquid ingredient.
  7. The system according to claim 1 wherein said distal end of said needle comprise two lateral openings.
  8. The system according to claim 1 wherein said syringe comprises a plunger and syringe barrel assembly.
  9. The system according to claim 8 wherein said plunger and syringe barrel are composed of polypropylene.
  10. The system according to claim 1 wherein said second opening of said mixing vial cap is dimensioned to accommodate insertion of said needle of the needle and syringe assembly therethrough.

11. The system according to claim 2 wherein said funnel comprises an exterior surface structured to fixedly and removably engage at least one rim diameter of a container opening.
12. The system according to claim 11 wherein said funnel comprises an exterior surface structured to fixedly and removably engage two different rim diameters.
13. The system according to claim 12 wherein the exterior surface of said funnel comprises a series of steps that coordinate to engage a plurality of container rim diameters.
13. The system of the invention further comprising a spatula structured to fit within both said mixing vial and the interior dimensions of said funnel.
14. The system according to claim 13 wherein said spatula comprises an elongated planar body having first and second end portions, said first end portion having a width different than that of second end portion.
15. A kit for preparing surgical cement comprising the system according to claim 2 and further comprising an additional component selected from the group consisting of a tray, packaging, liquid ingredient, liquid ingredient container, powder ingredient, powder ingredient container, gloves, eye shield, face mask, polymer delivery device, needle sheath, drape, tray cover, disposal container, and combinations thereof.
16. A kit for preparing surgical cement comprising the system according to claim 2 and further comprising a liquid container pre-filled with a liquid ingredient.

17. A kit for preparing surgical cement comprising the system according to claim 2 and further comprising a powder ingredient container pre-filled with a powder ingredient.
18. A kit for preparing surgical cement comprising the system according to claim 2 and further comprising a powdered ingredient within said mixing vial.
19. The kit according to claim 19 wherein said powder ingredient within said mixing vial is an opacifier.
20. A process for preparing an opacified surgical cement comprising a liquid ingredient and dry-state powder ingredient using a system comprising a first vial, funnel, mixing vial, and syringe and needle assembly, said process comprising the steps of:
  - i) fixedly coupling a funnel to an open mixing vial, said mixing vial being pre-filled with a dry-state powdered opacifier and having a removable cap further comprising a secondary opening and secondary removable cap;
  - ii) adding a first dry-state powder ingredient to said mixing vial through said funnel and combining the first dry-state powder ingredient with said opacifier;
  - iii) transferring a liquid ingredient from a liquid ingredient container into said mixing vial using a syringe and needle assembly, said transfer being accomplished by inserting said needle through said secondary opening of the mixing vial cap attached to said mixing vial and ejecting liquid therein, said needle comprising a closed distal tip and at least one lateral opening;
  - iv) attaching said secondary cap onto said mixing vial cap and agitating the contents of the mixing vial;

- v) fixedly attaching said funnel again to an opening of a polymer delivery barrel and pouring contents from said mixing vial through said funnel into said polymer delivery barrel.

wherein said funnel is structured for removable and fixed coupling to the opening dimensions of both said mixing vial and said polymer delivery barrel.

- 21. The process according to claim 20 wherein the surgical cement to be prepared is opacified polymethylmethacrylate and said liquid ingredient comprises liquid methacrylate monomer and said solid powder ingredient comprises polymethylmethacrylate and an opacifier.
- 22. The process according to claim 21 wherein said opacifier is barium sulfate.
- 23. The process according to claim 20 wherein the first vial comprises a container and removable cap.
- 24. The process according to claim 23 wherein said first vial container is composed of a material that is chemically compatible with said liquid ingredient.
- 25. The process according to claim 20 wherein said distal end of said needle comprise two lateral openings.
- 26. The process according to claim 20 wherein said syringe comprises a plunger and syringe barrel assembly.
- 27. The process according to claim 26 wherein said plunger and syringe barrel are composed of polypropylene.
- 28. The process according to claim 20 wherein said second opening of said mixing vial cap is dimensioned to accommodate insertion of said needle of the needle and syringe assembly therethrough.

29. The process according to claim 20 wherein said funnel comprises an exterior surface structured to fixedly and removably engage at least one rim diameter of a container opening.
30. The process according to claim 29 wherein said funnel comprises an exterior surface structured to fixedly and removably engage two different rim diameters.
31. The process according to claim 30 wherein the exterior surface of said funnel comprises a series of steps that coordinate to engage a plurality of container rim diameters.
32. The process according to claim 20 wherein step (ii) further comprises scraping the interior surface of the funnel with a spathula, said spathula being structured to fit within both said mixing vial and the interior dimensions of said funnel.
33. The process according to claim 20 wherein step (v) further comprises scraping the interior surface of the funnel with a spathula, said spathula being structured to fit within both said mixing vial and the interior dimensions of said funnel.